

REMARKS

This request for reconsideration is filed in response to the final Office Action dated December 8, 2006. This application should be allowed and the case passed to issue.

Claims 1-20 are pending in this application. Claims 6-10 have been withdrawn pursuant to a restriction requirement. Claims 1-5 and 11-20 have been rejected.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 13, 14, 17, 18, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lambeth et al. (WO 99/24973). This rejection is traversed, and reconsideration and withdrawal respectfully requested. The following is a comparison between the invention, as claimed and the cited prior art.

An aspect of the present invention, per claim 1, is a perpendicular magnetic recording medium comprising a non-magnetic substrate having a surface and a layer stack formed over the substrate surface. The layer stack comprises, in overlying sequence from the substrate surface, a magnetically soft underlayer, a non-magnetic interlayer structure, and a magnetically hard perpendicular main recording layer. The non-magnetic interlayer structure is selected from the group consisting of a structure comprising a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material; a structure comprising, in overlying sequence, a layer of a *fcc* Au-containing non-magnetic material adjacent the magnetically soft underlayer and having a $\langle 111 \rangle$ preferred growth orientation, and n layers of a different *fcc* non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation, where $n = 1 - 5$; a structure comprising, in overlying sequence, a layer of a *fcc* Au-containing non-magnetic material adjacent the magnetically soft underlayer and having a $\langle 111 \rangle$ preferred

growth orientation, n layers of a different *fcc* non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation, where $n = 1 - 5$; and n layers of a *hcp* non-magnetic material having a $\langle 0002 \rangle$ preferred growth orientation, where $n = 1 - 5$, and an $(fcc)_1/(hcp)_1/(fcc)_2/(hcp)_2$ structure comprising, in overlying sequence, a first *fcc* layer $(fcc)_1$, a first *hcp* layer $(hcp)_1$, a second *fcc* layer $(fcc)_2$, and a second *hcp* layer $(hcp)_2$, wherein at least the first *fcc* layer is an Au-containing non-magnetic material.

The Examiner asserted that Lambeth et al. disclose a perpendicular magnetic recording medium comprising a non-magnetic substrate, a layer stack (page 51, lines 9-11) comprising a magnetically soft underlayer (NiFe), a non-magnetic interlayer structure (Ag(111)/Ti(0002), and a perpendicular magnetic recording layer. The Examiner further averred that Lambeth et al. disclose that Au and Ag are taught as suitable fcc materials (page 16, lines 7-20). The Examiner acknowledged that Lambeth et al. fail to disclose the layer of different material comprising Ru, instead teaching a layer of hcp titanium. The Examiner deemed that hcp titanium layers and hcp Ru layers of Ru alloys are known equivalents in hcp non-magnetic interlayers for use in controlling the crystallographic growth, orientation and properties of perpendicular recording media as allegedly taught by Nakamura et al.

The combination of Lambeth et al. and Nakamura et al. does not suggest the claimed magnetic recording medium. The Examiner has not established a *prima facie* case of obviousness because the Examiner has not established that Ti layers and Ru or Ru alloy layers are known equivalents in perpendicular magnetic recording medium having a non-magnetic interlayer structure, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in

overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, as recited in claim 1.

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958) (The mere fact that components are claimed as members of a Markush group cannot be relied upon to establish the equivalency of these components.). The Examiner has not established that Ti and Ru and Ru alloys are known equivalents when used in the claimed structure. Further, because different elements and alloys have different lattice parameters and crystallographic structures and the effect the underlayer has on the overall magnetic recording medium is also dependent on the lattice parameters and crystallographic structure of underlying and overlying layers, it is clear that one of skill in this art would not have recognized Ti and Ru and Ru alloys as known equivalents in the claimed magnetic recording medium.

Obviousness can be established only by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006); *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no motivation in Lambeth et al. and Nakamura et al. to substitute an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or

underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Lambeth et al. to provide the magnetic recording medium according to the elected species recited in claim 1. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). There is no suggestion in either Lambeth et al. or Nakamura et al. to modify the magnetic recording medium of Lambeth et al. to obtain the claimed magnetic recording medium.

The requisite motivation to support the ultimate legal conclusion of obviousness under 35 U.S.C. § 103 is not an abstract concept, but must stem from the applied prior art as a whole and realistically impel one having ordinary skill in the art to modify a specific reference in a specific manner to arrive at a specifically claimed invention. *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Accordingly, the Examiner is charged with the initial burden of identifying a source in the applied prior art for the requisite realistic motivation. *Smiths Industries Medical System v. Vital Signs, Inc.*, 183 F.3d 1347, 51 USPQ2d 1415 (Fed. Cir. 1999); *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1449 (Fed. Cir. 1997). The Examiner did not identify any motivation in Lambeth et al. or Nakamura et al. to substitute an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Lambeth et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

In rejecting a claim under 35 U.S.C. § 103, the Examiner is required to discharge the initial burden by, *inter alia*, making "**clear and particular**" factual findings as to a **specific**

understanding or **specific technological principle** which would have **realistically** impelled one having ordinary skill in the art to modify an applied reference to arrive at the claimed invention based upon facts, -- not generalizations. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); *Ecolochem Inc. v. Southern California Edison, Co.*, 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); *In re Kotzab, supra*; *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). That burden has not been discharged, as the Examiner has provided no factual basis for modifying the magnetic medium of Lambeth et al. to include an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Lambeth et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

The only teaching of the perpendicular magnetic recording medium comprising a layer stack comprising, in overlying sequence from the substrate surface, a magnetically soft underlayer, a non-magnetic interlayer structure, and a magnetically hard perpendicular main recording layer, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Examiner's retrospective assessment of the claimed invention and use of unsupported conclusory statements are not legally sufficient to generate a case of *prima facie*

obviousness. The motivation for modifying the prior art must come from the prior art and must be based on facts. The Examiner is not free to ignore the judicial requirement for **facts**. To do so is legal error. *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002). Apparently, the Examiner has relied on improper hindsight reasoning in reaching the conclusion of obviousness.

Claims 1-5 and 11-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Abarra et al. (U.S. Pat. Pub. No. 2003/0186086) in view of the knowledge in the art as exemplified by Chen et al. (U.S. Pat. Pub. No. 2004/0191578) (Chen et al. '578) and/or Chen et al. (U.S. Pat. No. 6,759,149) (Chen et al. '149) and/or Girt et al. (U.S. Pat. No. 6,777,112) and/or Lal et al. (U.S. Pat. No. 5,922,442) and/or Malhotra et al. (IEEE Trans. Mag., 36(5), 9/2000, 2309-2311). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner asserted that Abarra et al. disclose a perpendicular magnetic recording medium comprising a non-magnetic substrate, a layer stack (Fig. 13, Ref. No. 51) comprising a magnetically soft underlayer (61), a non-magnetic interlayer structure (62/53/54/55), and a recording layer (56). The Examiner further averred that Abarra et al. disclose a layer comprising fcc Au-containing non-magnetic material having a <111> preferred growth orientation (paragraphs 0070-0073 and 0077). The Examiner acknowledged that Abarra et al. fail to disclose a layer of different material comprising Ru, and instead teach that element 54 comprises a bcc Cr-M alloy, such as CrMo, CrTi, CrV, or CrW. The Examiner deemed that bcc CrRu layers and bcc Cr-M alloy layers are known equivalents in the bcc non-magnetic interlayers for use in controlling the crystallographic growth, orientation and properties of perpendicular recording media as allegedly taught by Chen et al. '578, Chen et al. '149, Girt et al., Lal et al., and Malhotra et al.

Abarra et al., Chen et al. '578, Chen et al. '149, Girt et al., Lal et al., and Malhotra et al., whether taken alone, or in combination do not suggest the claimed perpendicular magnetic recording medium. Initially, it is noted that Chen et al. '149 and Girt et al. are not available as prior art under 35 U.S.C. § 103(c). Chen et al. '149 and Girt et al. were cited as prior art via 35 U.S.C. § 102(e) because they had an earlier filing date than the instant application and were copending with the instant application. The instant application, Chen et al. '149, and Girt et al. were, at the time the instant invention was made, owned by the same person (Seagate Technology LLC) or subject to an obligation of assignment to the same person. Ergo, by virtue of 35 U.S.C. §103(c), Chen et al. '149 and Girt et al. may not be relied upon to support a rejection under 35 U.S.C. §103. (*See* MPEP § 706.02(I)(2)(II)).

As regards the combination of Abarra et al., Chen et al. '578, Lal et al., and Malhotra et al. The Examiner has not established a prima facie case of obviousness because the Examiner has not established that bcc CrRu layers and bcc Cr-M alloy layers are known equivalents in perpendicular magnetic recording medium having a non-magnetic interlayer structure, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, as recited in claim 1.

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). The Examiner has not established that the Cr-M alloy of Abarra et al. and the CrRu alloy layers of Chen et al. '578, Lal et al., and Malhotra et al. are known equivalents when used in the claimed structure. Further, because different elements

and alloys have different lattice parameters and crystallographic structures and the effect the underlayer has on the overall magnetic recording medium is also dependent on the lattice parameters and crystallographic structure of underlying and overlying layers, it is clear that one of skill in this art would not have recognized the Cr-M alloy layer of Abarra et al. and the CrRu alloy layers of Chen et al. '578, Lal et al., and Malhotra et al. are known equivalents in the claimed magnetic recording medium.

There is no motivation in Abarra et al., Chen et al. '578, Lal et al., and Malhotra et al. to substitute an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Claims 1-5 and 11-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Abarra et al. in view of Yamamoto et al. (U.S. Pat. Pub. No. 2004/0043258) in view of the knowledge in the art as exemplified by Chen et al. (U.S. Pat. Pub. No. 2004/0191578) (Chen et al. '578) and/or Chen et al. (U.S. Pat. No. 6,759,149) (Chen et al. '149) and/or Girt et al. (U.S. Pat. No. 6,777,112) and or Lal et al. (U.S. Pat. No. 5,922,442) and/or Malhotra et al. (IEEE Trans. Mag., 36(5), 9/2000, 2309-2311). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner acknowledged that Abarra et al. fail to explicitly disclose selecting Au or Au-X from the list of fcc materials. The Examiner, however, averred that Yamamoto et al. illustrate the Cu-X alloy and teach that Au is a suitable equivalent to Cu as a fcc based material (paragraph 0019).

Abarra et al., Yamamoto et al., Chen et al. '578, Chen et al. '149, Girt et al., Lal et al., and Malhotra et al., whether taken alone, or in combination do not suggest the claimed perpendicular magnetic recording medium. It is noted that Chen et al. '149 and Girt et al. are not available as prior art under 35 U.S.C. § 103(c). Chen et al. '149 and Girt et al. were cited as prior art via 35 U.S.C. § 102(e) because they had an earlier filing date than the instant application and were copending with the instant application. The instant application and Chen et al. '149 and Girt et al. were, at the time the instant invention was made, owned by the same person (Seagate Technology LLC) or subject to an obligation of assignment to the same person. Ergo, by virtue of 35 U.S.C. §103(c), Chen et al. '149 and Girt et al. may not be relied upon to support a rejection under 35 U.S.C. §103. (*See* MPEP § 706.02(I)(2)(II)).

As regards the combination of Abarra et al., Yamamoto et al., Chen et al. '578, Lal et al., and Malhotra et al. The Examiner has not established a *prima facie* case of obviousness because the Examiner has not established that bcc CrRu layers and bcc Cr-M alloy layers are known equivalents in perpendicular magnetic recording medium having a non-magnetic interlayer structure, wherein the interlayer structure comprises a layer of a *fcc* Au-containing non-magnetic material having a <111> preferred growth orientation and a layer comprising Ru in overlying or underlying contact with said layer of *fcc* Au-containing non-magnetic material, as recited in claim 1.

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). The Examiner has not established that the Cr-M alloy of Abarra et al. and the CrRu alloy layers of Chen et al. '578, Lal et al., and Malhotra et al.

are known equivalents when used in the claimed structure. Further, because different elements and alloys have different lattice parameters and crystallographic structure and the effect the underlayer has on the overall magnetic recording medium is also dependent on the lattice parameters and crystallographic structure of underlying and overlying layers, it is clear that one of skill in this art would not have recognized the Cr-M alloy layer of Abarra et al. and the CrRu alloy layers of Chen et al. '578, Lal et al., and Malhotra et al. are known equivalents in the claimed magnetic recording medium.

There is no motivation in Abarra et al., Yamamoto et al., Chen et al. '578, Lal et al., and Malhotra et al. to substitute an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Claims 1-5, 11-13, 17, and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nakamura et al. This rejection is traversed, and reconsideration and withdrawal respectfully requested.

The Examiner acknowledged that Yamamoto et al. fail to disclose the layer of different material comprising Ru, instead teaching a layer of hcp CoCr. The Examiner alleged that Nakamura et al. teach that instead of using a layer of hcp CoCr one should use a layer hcp Ru in order to improve the lattice matching between seed layer and the magnetic layer and hence improve the perpendicular magnetic properties.

Yamamoto et al. and Nakamura et al., whether taken alone or in combination, do not suggest the claimed perpendicular magnetic recording medium. Yamamoto et al. and Nakamura

et al. do not suggest an interlayer structure comprising of a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Contrary to the Examiner's allegations, there is no suggestion in Nakamura et al. to use a layer of hcp Ru **instead** of hcp CoCr to improve the lattice matching between seed layer and the magnetic layer and hence improve the perpendicular magnetic properties. There is no motivation in Yamamoto et al. and Nakamura et al. to substitute an interlayer structure comprising a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material into the magnetic recording media of Abarra et al. to provide the magnetic recording medium according to the elected species recited in claim 1.

Claims 14-16, 18, and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nakamura et al. and further in view of Abarra et al. This rejection is traversed, and reconsideration and withdrawal respectfully requested.

Yamamoto et al., Nakamura et al., and Abarra et al. whether taken alone, or in combination, do not suggest the elected species of perpendicular magnetic recording medium because the Abarra et al. do not cure the deficiencies of Yamamoto et al. and Nakamura et al. Abarra et al. do not suggest the interlayer structure comprising a layer of a *fcc* Au-containing non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation and a layer comprising Ru in overlying or underlying contact with the layer of *fcc* Au-containing non-magnetic material, as recited in claim 1.

The dependent claims further distinguish the claimed invention and are allowable for at least the same reasons as claim 1.

Applicants submit that the non-elected species of the claimed perpendicular magnetic recording medium are allowable because the cited references do not suggest a layer stack comprising, in overlying sequence from the substrate surface, a magnetically soft underlayer, a non-magnetic interlayer structure, and a magnetically hard perpendicular main recording layer, wherein the interlayer structure is selected from the group of in overlying sequence, a layer of a *fcc* Au-containing non-magnetic material adjacent said magnetically soft underlayer and having a $\langle 111 \rangle$ preferred growth orientation, and n layers of a different *fcc* non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation, where $n = 1 - 5$; a structure comprising, in overlying sequence, a layer of a *fcc* Au-containing non-magnetic material adjacent said magnetically soft underlayer and having a $\langle 111 \rangle$ preferred growth orientation, n layers of a different *fcc* non-magnetic material having a $\langle 111 \rangle$ preferred growth orientation, where $n = 1 - 5$; and n layers of a *hcp* non-magnetic material having a $\langle 0002 \rangle$ preferred growth orientation, where $n = 1 - 5$; and an $(fcc)_1/(hcp)_1/(fcc)_2/(hcp)_2$ structure comprising, in overlying sequence, a first *fcc* layer $(fcc)_1$, a first *hcp* layer $(hcp)_1$, a second *fcc* layer $(fcc)_2$, and a second *hcp* layer $(hcp)_2$, wherein at least the first *fcc* layer is an Au-containing non-magnetic material, as recited in claim 1.

Thus, Applicants respectfully request rejoinder, examination, and allowance of the withdrawn species upon the allowance of species I.

In view of the above remarks, Applicants submit that this case should be allowed and passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

10/776,222

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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